Art. VII.—*Description of a New Obstetric Forceps constructed upon Philosophical Principles.* By J. P. Bethell, M.D., formerly Physician to the City Hospital, Philadelphia. (With a Plate.)

In attempting to trace the history of obstetrical forceps during a period of two hundred years, one cannot fail to be forcibly impressed with the marked alterations they have undergone. Since the time Chamberlen's secret became known to the profession, a great variety of instruments have been introduced, and it seems not a little singular that they should all differ in size and form.

Having encountered difficulties in the application and proper adjustment of forceps of several different patterns, the long as well as short instruments; and finding one to answer better than another according to circumstances, I was naturally led to analyze the principles upon which they were constructed, as well as to compare and contrast them. "I began to consider the whole in a mechanical view, and to reduce the extraction of the child to rules of moving bodies in different directions. In accordance with this plan, I more accurately surveyed the dimensions and form of the pelvis together with the figure of the child's head, and the manner in which it passed along in natural labour."[1] It then occurred to my mind that properly constructed forceps should adapt themselves equally well to the maternal pelvis and fœtal cranium; in other words, the external outlines should harmonize with the curves of the female pelvis, whilst the internal form and dimensions should accord with the head of the child; at the same time the instruments should have a sufficient length to allow the blades to pass entirely above the superior strait or brim of the pelvis, whilst the lock remains entirely outside of the external organs.

Instruments founded upon these principles operate in the axes of all the planes and straits of the pelvis, whether adjusted above the brim, in the excavation, or at the outlet; always equidistant from sacrum and pubis, the blades naturally and of necessity follow the central curve of the pelvic cavity (the circle of Carus), and as a consequence operate in the axis of each particular plane and strait through which they may be passing. The cranial faces of the blades should fit the child's head closely, and yet a sufficient amount of room must be allowed to prevent the possibility of undue pressure being made upon it; when adjusted (if the curves be properly formed), the grasp is so perfect that slipping is out of the question; another and very decided advantage is, that meeting the head flatlong, there is no risk of indenting the skull or cutting the scalp. In the elegant short forceps invented by Dr. Davis, of London, the lesser and greater curves are in unison with the pubic and sacral circle—segments of the pelvic canal; but, in consequence of the shortness of their shanks, they cannot be applied when the head is arrested at the superior strait; besides, the lock is greatly inferior to Siebold's; and again, the curves of the cranial faces are not in accordance with the convex form of the child's head.

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[1] Smellie, quoted in Churchill's Operative Midwifery, p. 114.

The long instruments of Levret and the almost numberless modifications of them, French as well as German, comply with neither the pelvic concavities nor to the cephalic convexities. In consequence of their inadaptation the child is often mutilated or destroyed, and the mother subjected to the most serious or even fatal injuries. The blades being not less than three inches longer than the longest cranial measurement, cannot fit in the long or occipito-mental direction; the fenestra are too narrow to allow the parietal protuberances to pass through them; and the concave face, in the transverse or sacro-pubic direction, is not the segment of a circle whose diameter is three and a half inches. The sacral and pubic curves bear no relationship to the cavity for which they were designed. A pair in my possession (Baudelocque's) may serve as a specimen of the entire class; their whole length in a straight line is eighteen inches, blades eight and a half, shanks one and a half, handles eight and a half.[1] The radius of the posterior curve is seventeen inches, that of the anterior ten and a half. The widest space between the blades when the handles are closed, strange to say, is near the apex; and when the blades are sufficiently open to receive the bi-parietal diameter, say three and a half inches, the ends are full three inches apart; weight, twenty-six and a quarter ounces. No argument is required to show that this apparatus is totally unsuited to the purposes for which it was intended.

I shall now describe an instrument (see Plate) which appears to combine all the qualities of the short varieties without any of their disadvantages; at the same time *length*, the only point of superiority claimed for the long forceps, is secured without impairing its usefulness. Their entire length is sixteen and three-eighths inches; the measurement in a straight line from tip of the blade to shank, six and a quarter; length of shank, from the cavity to centre of the lock, three and a quarter; handles, from centre of the lock to extremities, seven inches; the radius of the sacral curve, about three and a quarter inches; radius of pubic curve near four inches; extreme width of the blade one inch and seven-eighths; fenestrum, one inch and three-eighths in width, and four and three-fourths in length.

The cephalic cavity, with the handles closed, measures from blade to blade at the parietal portion, that is, near the base, two and a half inches, but in consequence of the bi-lateral or parietal curve, it really measures at the centre three inches, at the temporal part two inches, and at the tips half an inch. This gives the occipito-mental curve, which has a radius of about five and a half inches. The bi-lateral or parietal curve, from the outside of the pubic to the outside of the sacral edge, has a radius of one inch and three-fourths; the rim of the blade is five-sixteenths of an inch wide, and scarcely one-sixteenth of an inch in thickness at the apex, gradually becoming thicker towards the base; the face of the rim is turned slightly off at the very extremity. The *shanks* take their origin from the superior rims of the blades, and by means of a twist at their junction, the upper is made to ride over the lower and to be directly in contact with it. This allows the blades throughout their entire length to remain parallel, and the screw prevents any twisting. By this arrangement the blades are thrown into the cavity of the pelvis without the perineum being pressed upon by the shanks; the advantage is obviously increased in all operations above the brim. The shank, at its junction with the blade is three-eighths of an inch wide, increasing towards the lock where it is one inch. Each shank is one-quarter of an inch thick, and when in contact the two measure one-half inch; consequently, when the blades are adjusted, the room occupied at the vulva is about one-half inch in every direction. Placed on a horizontal plane, the extremities of the blades have an elevation of four inches; weight less than seventeen ounces avoirdupois. In their pelvic curves and in the sacro-pubic width, as also in weight of metal, the blades resemble Dr. Davis's; the shanks are not unlike Dr. Hodge's; the lock is Siebold's; the cranial curves, I believe, differ from all others.

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[1] The fragmentary parts, when footed up, appear to increase the length by half an inch; but this is accounted for by measuring a curved instrument in straight lines.

The handles form a very obtuse angle with the shanks, by which means the power is expended in a proper direction; this was adopted at the suggestion of Mr. Rorer, an ingenious instrument-maker of this city. Their obvious advantages are that they always fit the female pelvis and the head of the child with greater accuracy than any other instrument in use.

They never operate in a false axis, but always follow the pelvic centres, and, consequently, the axes of all the straits and planes in which they may be adjusted; hence, far less power is required; besides, additional security is given to both mother and child, as they do not infringe upon either.

During the past two years I have applied these forceps in consultation with different practitioners; and on several occasions where the most approved instruments had been previously tried unsuccessfully.

EXPLANATION OF PLATE.

Fig. 1. Represents a section of the pelvis, showing its curves as well as the planes and straits, together with their axes and relative angles. The blade of the forceps being applied in order to show its relationship and adaptation.

The circle *A A A* follows the internal face of the sacrum, and represents its curve; which will be found to correspond with the posterior, or sacral curve of the forcep blade. The circle *B B* passing through the centres of the superior strait, middle plane, and inferior strait is the central pelvic circle, or "circle of Carus," and defines the true line of motion of bodies passing through the pelvic cavity. The circle *C C* represents the internal face of the pubis.

The perpendicular line *D D* represents the *axis* of the *body*. The line *E E* passes in front of the lumbar vertebra through the common centre of the pelvis, and through the centre of the outlet, and represents the axis of the inferior

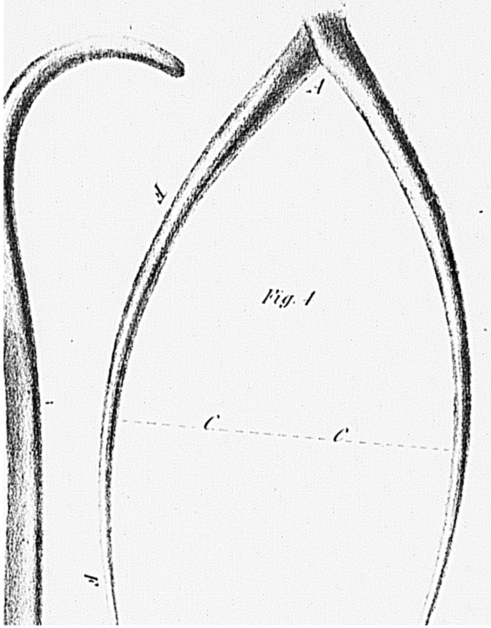


Fig. 4

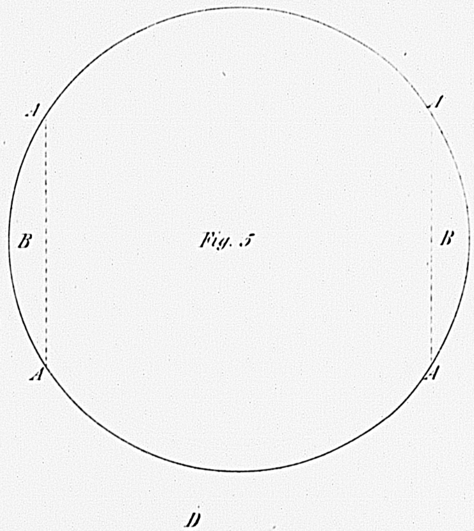
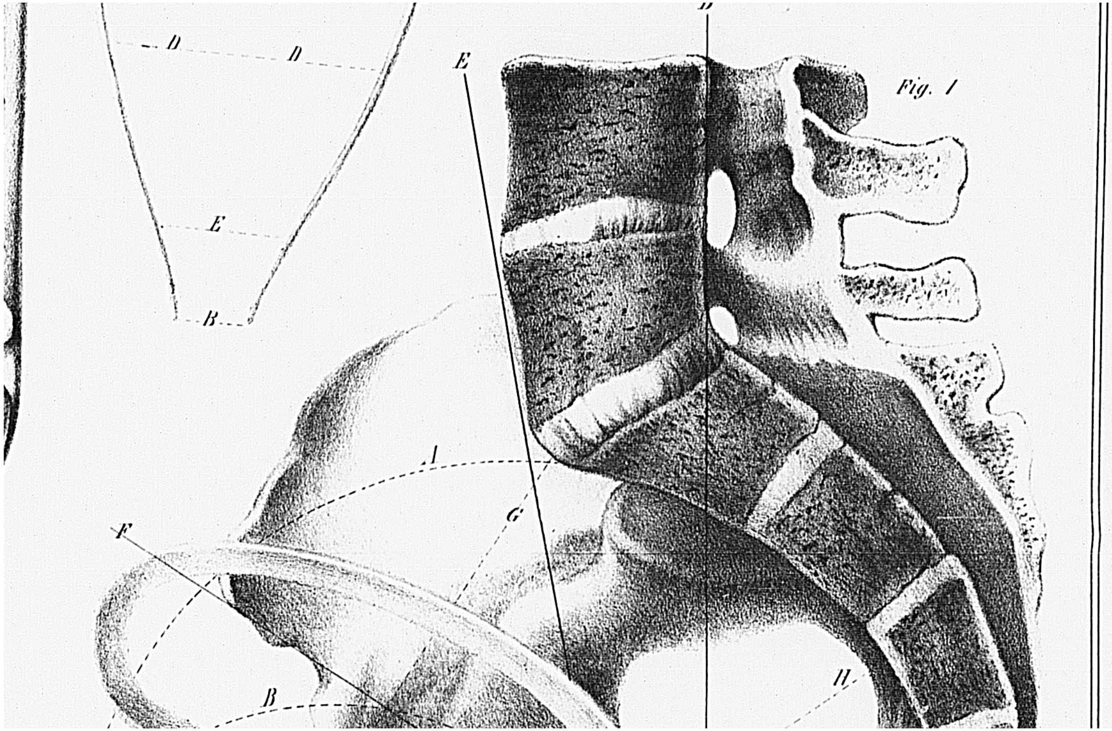


Fig. 5

Fig. 1



strait. The line *F F* represents the axis of the superior strait, and may be considered as passing from the fundus of the uterus, through the centre of the inlet as well as the common centre of the pelvis.

The line *G G* represents the plane of the superior strait, *H H* the central plane, and *I I* the plane of the inferior strait. The forcep blade being applied, it will be found occupying the central pelvic excavation; at the superior strait it is equidistant from the promontory of the sacrum and the superior portion of the pubis; at the inferior strait it is central; whilst the fenestrum covers every centre, without the blade encroaching upon any one part.

Traction being made upon the instrument, the line *F F* indicates the direction in which the power is applied at the pelvic entrance; whilst the line *E E* exhibits the direction in which the power is employed at the pelvic outlet. The instrument of necessity must follow the direction of the circle *B B*, which is the *natural line of motion.*

Fig. 2. Side view of male blade of the forceps, with its movable screw pivot *in situ*. *A.* Width of fenestrum one inch and three-eighths. *B.* Entire width of blade one inch and seven-eighths. *C C C C.* Rim of the blade, nearly three-eighths of an inch in width. *D D D.* Length of fenestrum, in a straight line, four inches and three-quarters. *E E.* Perpendicular elevation, four inches. Elevation of the instrument directly beneath the lock, in consequence of the handle being set at an obtuse angle with the shank, three-fourths of an inch. *F F.* The sacral, or posterior curve, having a radius of about three inches and a quarter. *G G.* The pubic, or anterior curve, having a radius of about four inches. *H H.* The shank, one-quarter of an inch thick, and from the blade to the centre of the lock, three inches and a quarter long, and from the centre of the lock to extremity of handle seven inches; the whole length of instrument measured at the base line, sixteen inches.

Observe that both shanks take their origin from the superior rims of the blades, by which arrangement the greater curve of the instrument may be passed deeply into the pelvis, without making pressure upon the perineum. The narrow thick portion of the blade, directly at its junction with the shank, has a short twist, the inferior blade upward and the superior blade downward, by which means both blades are retained parallel.

Fig. 3. Front view of the handles, lock, and shanks, showing the overlapping of the latter, and their union with the blades; width one inch at the lock, tapering to the blade, where it measures less than three-eighths of an inch. Having disposed of the pelvic parts of the instrument, we come to the cranial.

Fig. 4. Represents a front view of the edges of the blades; and in order to represent plainly the measurements, the foreshortening required to make the picture, has not been observed. It must be remembered that, in the following dimensions of the spaces between the two blades, the handles are closed. *A.* The occipital portion of the cavity where the shanks diverge to form the blades and leave the cranial space. *B.* The mental space, or distance between the extremities of the blades is half an inch. From *A* to *B*, taken in a straight line, measures six inches and three-eighths. *C C.* The space from blade to blade, taken at the superior edges of the blades, two inches and a half at its widest part, which may be called its parietal width. *D D.* The facial part, two inches. *E.* Mental space, near the tips, one inch. The line *F F*, the *occipito-mental curve*, corresponding to the longest diameter of the child's head. And yet

another curve requires notice, viz., that in the sacro-pubic direction of the blades. It should meet a circle whose diameter is three inches and a half, which is the bi-parietal measurement as laid down by most writers; although it must be confessed rather small for the average size of crania of this region.

Fig. 5. Represents the parietal circumference. *A A.* On either side, the space over which the blades pass and embrace the head. It will readily be seen that the spaces *B B* add one-quarter of an inch on each side to the parietal space of the blade, gaining one-half inch, giving us a bi-parietal measurement of three inches, although but two and a half at the edges of the blades. Now, in consequence of the width of the fenestra, suppose the child's head pass through on each side one-quarter of an inch, we have our entire diameter of three inches and a half. So that, if the child's head were in accordance with this standard, it would be completely grasped without the possibility of undue pressure being exerted upon it.

PHILADELPHIA, *April* 24, 1853.

ART. VIII.—*Some Account of the Varioloid Disease which has recently prevailed, and is now prevailing (May 30, 1853), in the town of Gorham, Ontario County, New York.* By CHARLES A. LEE, M. D.

AT the request of Dr. H. A. Potter, of Gorham, a highly respectable practitioner of that place, Prof. Bryan and myself accompanied him, May 29, to visit a number of patients, some of whom had recovered from, and some were still labouring under an eruptive disease, the nature of which had given rise to much dispute among the physicians of the place, some calling it *chickenpox* others *smallpox.*

We first visited those who had been first attacked, viz., John and George M'Comb. John M'C., aged 19, took the disease in Rochester, sickened soon after he returned home, and was first visited by Dr. Potter, on the 4th of March, 1853. He found him with high inflammatory symptoms, skin hot and florid, great thirst, and at times delirious at night, talking in his sleep, and muttering to himself, though rational when fully roused. He had severe pains in the head and back for the first three or four days. The eruption first appeared on the fourth day, in the form of small watery vesicles about the forehead. At first, small red points made their appearance, which became filled in the course of forty-eight hours with water, which gradually assumed a milky colour. In a few spots, large watery blebs appeared; at this time (May 28), the places where the scabs come off are of a livid or chocolate colour, smooth, a few pits on the face, but the signs of suppuration of the cellular texture very slight. *He had never had kine-pock; though formerly vaccinated, it did not take,* and no scar on his arm is visible. He kept the house about ten days, and was visited but five times by his physician.

Two other sons, George, aged 19, and William, aged 21, had the disease, but not so severely. *Neither had been vaccinated.* George was taken on the 21st of March, fifteen days after John, showing the period of incubation to be at least ten days. The symptoms in both cases were similar, sore-throat was present in all three. The eruption also began about the face and hands,